J. Adelaide Bot. Gard. 2(2): 139-149 (1980)

THE GENUS *MALACOCERA* R.H. ANDERSON (CHENOPODIACEAE)

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Abstract

The endemic Australian genus *Malacocera* is revised and four species are recognized, namely *M. albolanata* (Ising) Chinnock, comb. nov. (syn. *Bassia albolanata*), *M. biflora* Ising, *M. gracilis* Chinnock sp. nov. and *M. tricornis* (Benth.) R.H. Anderson.

Descriptions, illustrations and distribution maps are provided, together with notes on ecology and relationships.

Introduction

When Anderson described *Malacocera* in 1926, he based it on *Chenolea tricornis*, which had been described by Bentham in 1870. In 1882, Mueller transferred the species to *Bassia* All. and he was followed by Black (1924). Ewart (1931), however, continued to follow Bentham, including *Malacocera* in the synonomy. Black (1948) accepted *Malacocera* and subsequent writers, e.g. Willis (1973), Wilson (1975) and Scott (1978), have also adopted this view.

A second species of *Malacocera*, *M. biflora*, was described by Ising in 1955, differing significantly from *M. tricornis* in the smaller, triangular, more irregular processes on the fruiting perianth and in the presence of two flowers in each leaf axil.

In 1964 Ising described a number of new species of *Bassia* including *B. albolanata*, which he compared with *B. chippendalei*, also newly described. However, an examination of the type of *B. albolanata* and the many other collections now at hand has satisfied me that this species should be included in *Malacocera*. Indeed, most specimens of *B. albolanata* in herbaria were identified as *M. tricornis* (see further comments under the species).

Relationships

Malacocera is distinguished from *Sclerolaena* R.Br.* by the relatively unhardened fruiting perianth, and by the presence of radiating, soft, tomentose processes in a tepaline position. *Sclerolaena* possesses a hardened fruiting perianth with radiating spines in a intertepaline position. In *Malacocera* these processes, which develop after anthesis, are attached to the full length of the fruiting perianth. They are flattened in either the vertical or horizontal plane and are oblong to triangular with obtuse apices. In *M. albolanata* a number of processes are more tapered and spine-like but they are never pungent. In this species one of the processes is usually flattened and often bifid at the apex. Occasionally in *M. gracilis* two or more processes may fuse to form plate-like structures.

The four species of *Malacocera* are vegetatively very similar in having striate, densely lanate branches with spiral, villous leaves. However, *M. gracilis* differs significantly from the other three in its more slender branches and appressed leaves. The number of flowers in the leaf (bract) axil varies from 1 to 2, but the number per axil is constant for each species. The size of the fruiting perianth and the number and shape of its tepaline processes vary considerably in the four species. *Malacocera albolanata* and *M. biflora*

*Until recently all Australian species of *Sclerolaena* were included by Australian authors in the genus *Bassia* (See Scott, 1978).

possess paired flowers. These flowers are symmetrically identical for a particular branch. (For further details on orientation of flower and fruit in subtribe Kochiinae see Wilson, 1975, p. 12.) *Malacocera gracilis* and *M. tricornis* have solitary flowers.

Species with paired flowers do not appear to be more closely related to one another than to those species with solitary flowers; *M. albolanata* is probably more closely related to *M. tricornis* as the processes (especially when only three are developed in the former species) are very similar in shape and size. In *M. biflora* the processes are small and triangular and differ markedly from the above two species. *M. gracilis* does not appear to be closely related to the other species as the (major) processes are orientated in a reverse direction to form an (inverted-Y) configuration. In this species the radicular slit is situated between the two lower major processes, while in the others it is adjacent to the base of the lowermost lobe.

Distribution

Malacocera is most common in the arid areas of eastern South Australia where all four species occur and two are endemic. It is also particularly common in western New South Wales (see Fig. 6).

M. tricornis, the most widespread species, is common in South Australia, western New South Wales and the extreme north-west of Victoria, but it is rare in Queensland, Northern Territory and Western Australia. There is one certain locality in Western Australia. A second specimen, in Herb. PERTH, was collected by W.V. Fitzgerald at "Skirmish Hill", but, all attempts to locate this site in Western Australia have failed. Mr. P.G. Wilson, however, (pers.comm.) has examined Fitzgerald's manuscript Flora of Western Australia in which there is recorded a collection of *M. tricornis* made by himself at Nannine. As the Nannine specimen has not been located, it is possible that "Skirmish Hill' and Nannine refer to the same locality.

M. albolanata is also quite widespread, extending from the Lake Eyre Basin Region in South Australia to south-western Queensland and western New South Wales, while *M. gracilis* and *M. biflora* both have very restricted distributions in South Australia.

All species appear to favour heavy clayey soils and are most frequently encountered along river systems on alluvial flats or around salt lakes or saline depressions in chenopodiaceous shrublands.

MALACOCERA R.H. Anderson

(Greek *malakos*, soft; *ceras*, horn)

Malacocera R.H. Anderson, Proc.Linn.Soc.N.S.W.51: 382(1926); J.M. Black, Fl.S.Aust.ed.2: 308(1948); P.G.Wilson, Nuytsia 2,1: 9(1975); A.J. Scott, Feddes Rep. 89, 2-3: 118(1978).

Type species: Malacocera tricornis (Benth.) R.H. Anderson.

Shrubs ephemeral or perennial, to 80 cm high; main stem woody at least near ground level; branches lanate, terete, striate. *Leaves* spiral, sessile, linear, appressed or spreading and often recurved, scattered or clustered. *Flowers* solitary or paired in the leaf axils, bisexual or female. *Perianth* small, globose, lanate, tepals 5; stamens 5; style 2 or 3. *Fruiting perianth* flattened, with the 3-5 tepaline processes forming a Y, inverted-Y or star-shaped configuration; tube unhardened except near the base; vertical slit prominent, opposite the radicle; processes 3-5, tepaline, flattened or sub-cylindrical, linear to triangular, lanate or sparsely lanate above and towards the tips, attached to the whole length of the perianth tube, three of the processes usually larger (major) with 1 or 2 smaller

processes (minor) developed opposite the remaining tepals or all processes of similar length. *Pericarp* membranous. *Seed* horizontal, radicle centrifugal, perisperm abundant.

Key to Species

1. Flowers paired in leaf axils 2
   Flowers solitary in leaf axils 3
2. Processes linear, >2 mm long, two or more, filiform, appearing blackish-brown through tomentum . . . . . *M. albolanata* 1
   Processes triangular, c. 1.5 mm long, flattened, appearing yellowish through tomentum . . . . . *M. biflora* 2
3. Stems weak, <1 mm thick, leaves appressed, processes 4-5, major ones forming an inverted-Y configuration . . . . . *M. gracilis* 3
   Stems robust, >1 mm thick, leaves spreading, processes 3 rarely 4 forming a Y configuration . . . . . *M. tricornis* 4

1. **Malacocera albolanata** (Ising) Chinnock, comb.nov.

Bassia albolanata Ising, Trans.Roy.Soc.S.Aust.88: 95(1964).

Sclerolaena albolanata (Ising) Scott, Feddes Rep. 89, 2-3: 111(1978).

Holotype: Between Mungeranie and Cowarie, South Australia, *J.B.Cleland s.n.*, 17.ix.1956 (AD 95820121!). See Fig. 2A.

Shrub to 40 cm high; branches densely white-lanate, finely ribbed. *Leaves* scattered, linear, 6-18 mm long, c. 1 mm broad, densely villous at first, becoming almost glabrous with age, spreading, recurved or sometimes curled. *Flowers* paired in the leaf axils, densely lanate; styles 2. *Fruiting perianth* flattened, depressed above, forming a Y or star configuration; processes 3-5, 2.5-4.5 mm long, with 3 major and 2 minor ones or all of

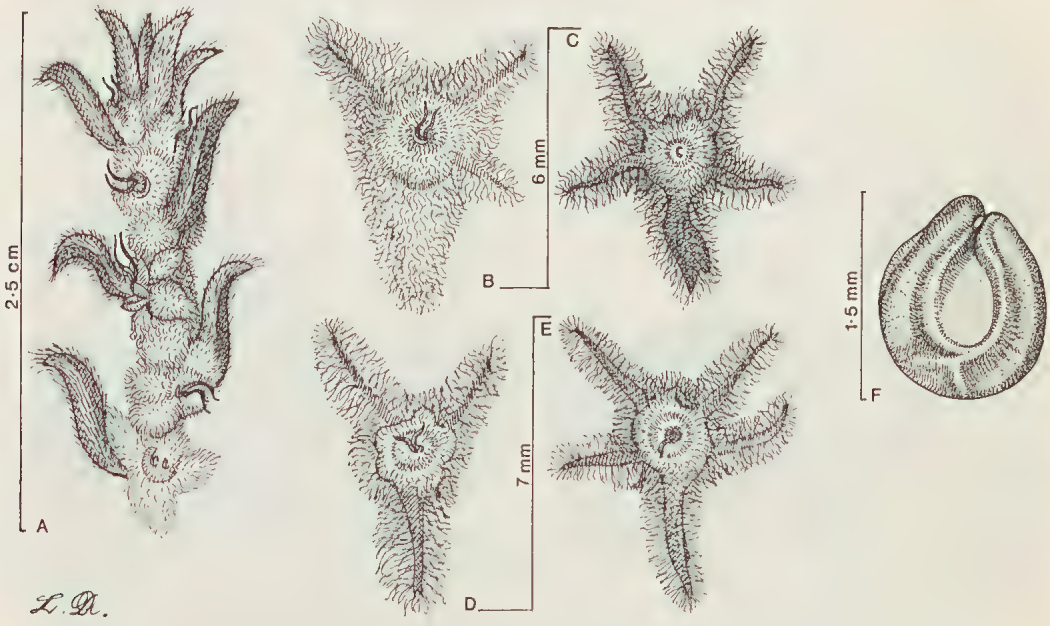

Fig. 1. *Malacocera albolanata* (Ising) Chinnock. A, habit of branch showing densely clustered flowers; B-E, variation in fruiting perianths; F, seed. (A-C, based on type; D-F, *Weber 4549*)

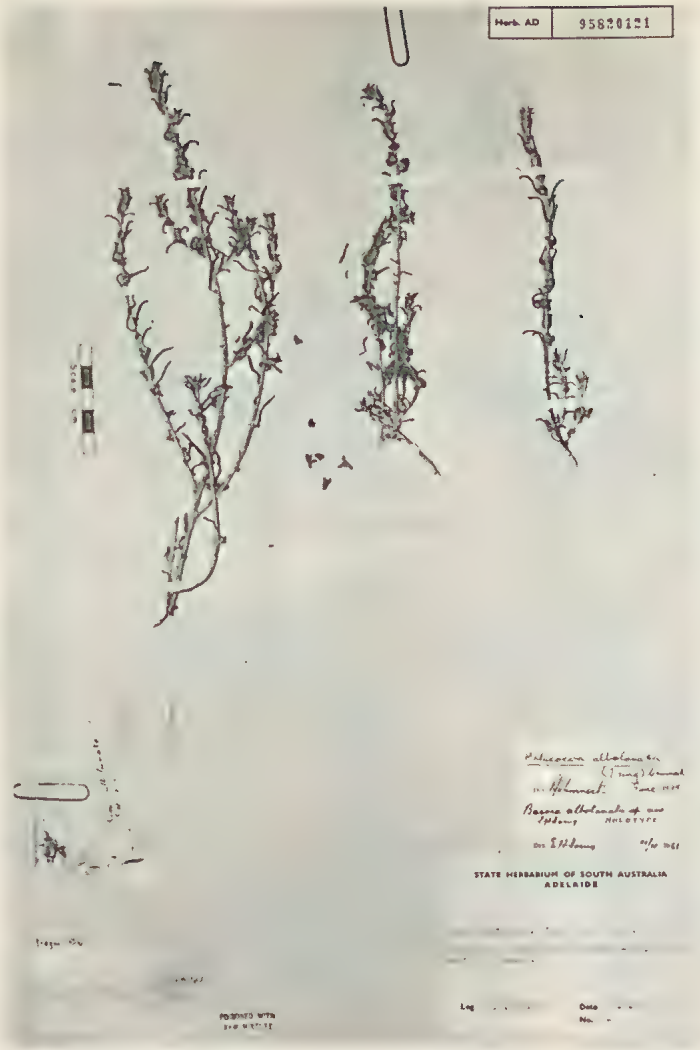

Fig. 2A. Holotype of *M. albolanata* (*J.B. Cleland s.n.*, AD 95820121).

Fig. 2B. Holotype of *M. biflora* (*E.H. Ising 3616*, AD).

similar length; with one or more filiform towards the tip but not pungent, 1(-2) bifid at the apex; densely white-lanate, often becoming sparsely lanate at maturity, the surface blackish-brown with short glandular hairs; style base rarely persistent. *Seed* sub-orbicular, pale yellow-brown, c. 1.5 mm diameter. (Fig. 1.)

Distribution

North-east South Australia, south-west Queensland and western New South Wales. See Fig. 6.

Specimens examined

SOUTH AUSTRALIA: *R.H. Kuchel 2866*, 3 m W of Lake Harry, 1.ix.1971 (AD); *J.Z. Weber 2148*, between Curraworra Bore and Starvation Lake, 29.vii.1971 (AD); *J.Z. Weber 4549*, 5 km N of Wathakertie Waterhole, 17.viii.1975 (AD).

QUEENSLAND: *S.L. Everist 4065*, Cuddapan c. 80 m WSW of Windorah 26.viii.1949 (BRI); *C.T. White 12004*, Dynevor Downs, 2.iv.1941 (BRI).

NEW SOUTH WALES: *R.J. Chinnock 3482*, 31.4 km N of Hawkers Gate, NSW/SA border, 6.v.1977 (AD); *E.F. Constable 4641*, Buckanbee Homestead c. 10 m E of Tilpa, 27.x.1963 (NSW); *G.M. Cunningham 518*, Booligardie Paddock, Delalah Downs, 17.viii.1972 (NSW); *Dorman s.n.*, near Fromes Waterhole W end of Olive Downs, 5.ix.1967 (NSW); *S. Jacobs 3082*, 35 km N of Hawkers Gate, NSW/SA border, 7.v.1977 (AD, NSW); *P.L. Milthorpe 529*, Lake Stewart between Grey and Binera Downs, 11.ix.1971 (AD); *T.H. Riches 45*, Tchelery 28.x.1949 (CANB).

Ecology

Malacocera albolanata appears to favour saline depressions or clay pans on heavy clay soils subjected to occasional flooding. One collection, *White 12004*, stated, however, that it grew on the edge of a freshwater lake.

Notes

The illustration, identified as *B. albolanata* in Ising's paper (loc.cit. 69), does not appear to be of that species. It is not consistent with the manuscript sketches made by Ising and his note under the species (loc.cit. 95) states "*B. albolanata* is near to *B. chippendalei* Ising which has less dense indumentum" but the illustrations of the two species loc.cit. (Figs. 8 & 9) imply the reverse. Furthermore, although *B. albolanata* is said to have "one spine usually obtuse and toothed at the apex", this is not evident in Figs 9a and 9b of his paper.

2. **Malacocera biflora** Ising, Trans.Roy.Soc.S.Aust.78: 113(1955); Hj. Eichler, Suppl. Fl.S.Aust.119(1965).

Type: Evelyn Downs, 90 miles SW of Oodnadatta, South Australia, *E.H. Ising 3616*, 27.x.1953 (holo., AD!; iso. CANB!, K n.v., NSW!). See Fig. 2B.

Shrub to 25 cm tall, 50 cm diameter; branches erect or the laterals decumbent, densely white-lanate, striate. *Leaves* alternate, sessile, linear to oblong, subterete, acuminate, clustered, 5-12 (-25) mm long, white-to brown-villous. *Flowers* paired in the leaf axils, bisexual, densely lanate; tepals 5, covering the ovary; styles 2. *Fruiting perianth* flat, c. 5 mm long, 3 mm broad including the processes and forming a Y configuration; processes 3-4(-5), flattened, ± triangular, c. 1.5 mm long, densely lanate; the 4th and 5th process, if present, smaller than the major ones and often irregular in shape; style base usually not persistent; radicular slit adjacent to the base of the lowermost process. *Seed* brown, sub-orbicular, c. 1.5 mm diameter. (Fig. 3.)

Distribution

Restricted to the Lake Eyre Basin Region of South Australia. See Fig. 6.

Specimens examined

SOUTH AUSTRALIA: *Lake Eyre Basin Region*: Herb. *J.B. Cleland s.n.*, 25 km NW of Oodnadatta,

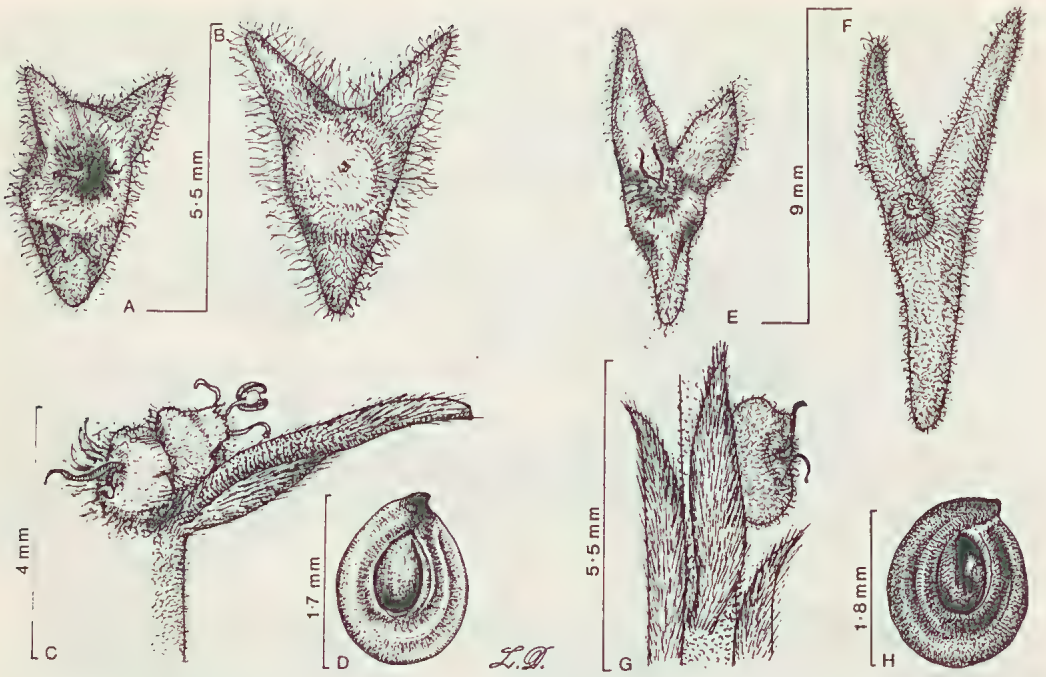

Fig. 3. *Malacocera biflora* Ising. A-B, fruiting perianths; C, portion of branch with paired flowers in the leaf axil; D, seed. *Malacocera tricornis* (Benth.) Anderson. E-F, fruiting perianths; G, portion of branch with leaves and a flower; H, seed. (A-D based on the type; E, *Chinnock 1471*; F-H, *Ising* 96620205).

22.viii.1933 (AD 966041008); *E.H. Ising s.n.*, Evelyn Downs, Oct. 1949 (AD 96621051); 13.x.1953 (AD 96621059, AD 97038014); 27.x.1953 (AD 96620204, 96929690, 96929692-96929698); 19.viii.1954 (AD 96228187); 26.viii.1954 (AD 97038012); 2.vii.1955 (AD 97038008); 12.viii.1955 (AD 97038007); 13.viii.1955 (AD 97038009); 10.x.1955 (AD 97038011); 17.x.1955 (AD 97038010); 29.x.1955 (AD 97038013); *E.H. Ising 3617*, Evelyn Downs, 27.x.1953 (AD, MEL); *E.H. Ising s.n.*, 30 km E of Evelyn Downs, 16.ix.1953 (AD 96929691, 96929699); *E.H. Ising s.n.*, Mt Barry Station, 7.viii.1954 (AD 97038115); c. 20 km W of Mt Barry, 12.xi.1955; (AD 97038116); *B. Lay 614*, Engenina Creek, c. 50 km SE of Coober Pedy, 10.x.1971 (AD, MEL).

Ecology

Little is known of the ecology of *M. biflora*. None of Ising's many collections from the Evelyn Downs region has any information on the environment but the label on one collection, *Lay 614*, does state that the species was growing on a "sandy arid treeless plain near a watercourse", which suggests soil preferences similar to the other species.

3. **Malacocera gracilis** Chinnock, sp. nov.

Planta ephemera vel breviter perennis, ramis erectis gracilibus, 0.5-0.8 mm diametro, lanatis. Folia et perianthia fructicantia ramos appressa. Perianthium fructificans processibus tribus usque quinque, lanatis, complanatis. Semen brunneum, nitens, c. 1.5 mm diametro.

Type: Near small salt lake on road to Chinaman Creek, west of Nectar Brook, South Australia, 32° 42′ S, 137° 54′ E, *R.J. Chinnock 1695*, 5.ix.1974 (holo., AD; iso. AD, B, BRI, CANB, K, MEL, NSW, NT, PERTH, US). See Fig. 5A.

Ephemeral or short lived perennial herb to 25 cm tall, 10-20 (-40)cm broad, with a woody rootstock; branches erect or the laterals decumbent, thin and flexible, 0.5-0.8 mm diameter, striate, densely white-lanate. *Leaves* spiral, sessile, linear, acuminate, subterete, appressed to branches, 2.5-4 (-5) mm long, white silky-villous. *Flowers* solitary, axillary, densely lanate; tepals 5, covering the ovary; styles 2. *Fruiting perianth* flattened,

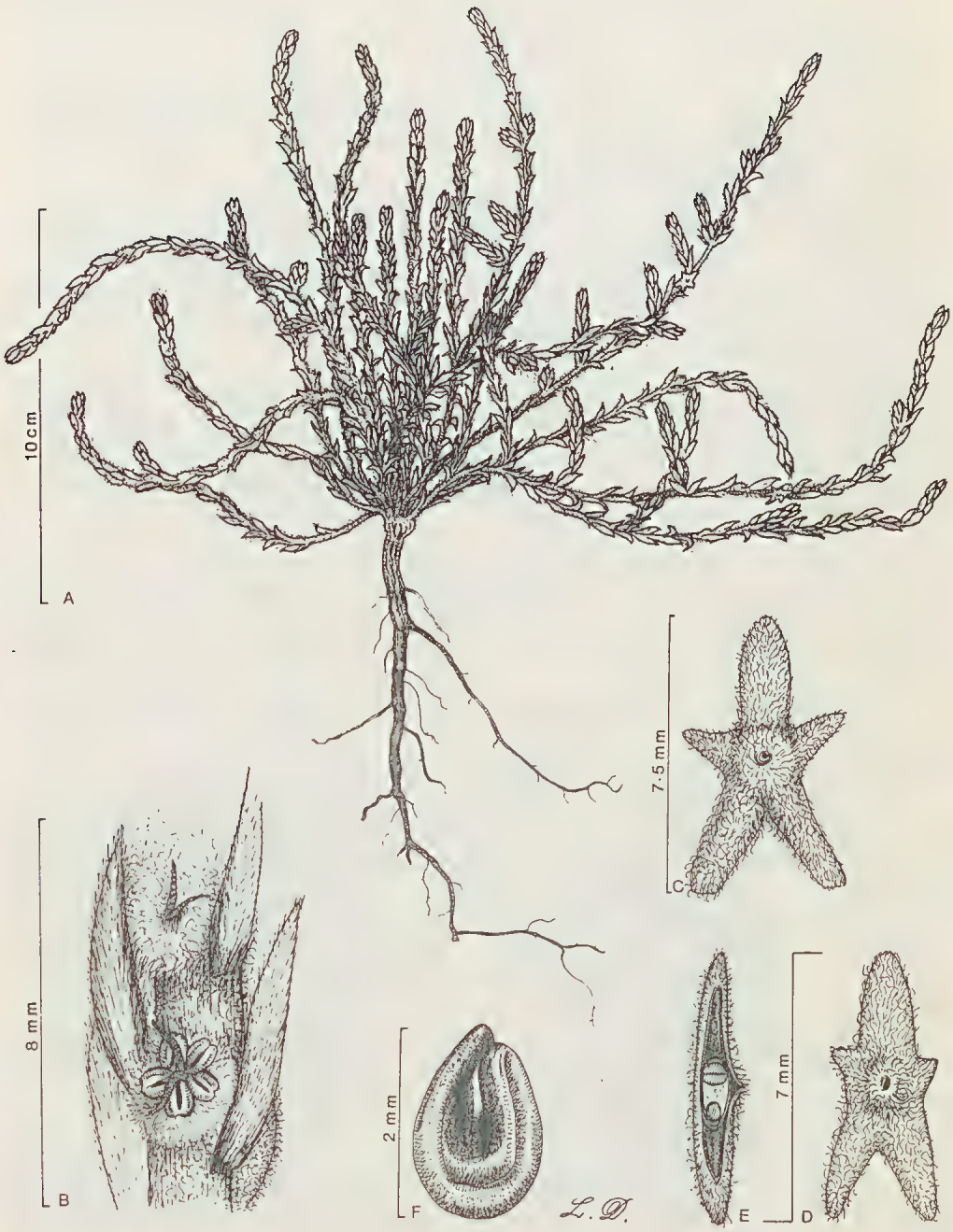

Fig. 4. *M. gracilis* Chinnock. A, habit; B, enlargement of branch with flowers and leaves; C, D, fruiting perianth; E, fruiting perianth in cross-section showing position of seed; F, seed. (A-F, based on type).

appressed to branch, forming an inverted-Y or star configuration; processes 3-5, the three major processes flat, 2 minor usually present but smaller, often irregularly formed and fused with the major processes to form plate-like expansions; radicular slit situated between the two lowermost processes; style not persistent. *Seed* sub-orbicular or ovoid, brown, shiny, smooth, c. 1.5 mm diameter. (Fig. 4.)

Distribution

This species is known only from South Australia where it occurs on the coastal strip between Port Augusta and Mt Grainger, Yalata Harbour and on the southern shores of Lake Callabonna. See Fig. 6.

Specimens examined

SOUTH AUSTRALIA: *Lake Eyre Basin Region*: *S. Jacobs 3564*, 103 km SW of Hawker Gate, S end of Lake Callabonna, 13.v.1979 (NSW, AD).

Eyre Peninsula Region: *R.J. Chinnock 2105*, gypseous rises around salt lake on road to Chinaman Creek, 32° 42′ S, 137° 54′ E, 30.ix.1974 (AD); *E.H. Ising s.n.*, Port Augusta, 5.viii.1954 (AD 96620181); *D.J.E. Whibley 5459*, between Point Patterson and Redcliff Point, 32° 36′ S, 137° 50′ E, 9.i.1975 (AD).

Ecology

M. gracilis is restricted entirely to powdery gypseous mounds in *Arthrocnemum* shrubland in the Port Augusta vicinity. This ephemeral species occurs in large numbers on these mounds and is associated with halophytic species such as *Disphyma clavellatum* (Haw.) Chinnock and *Angianthus* aff. *brachypappus* F.Muell.. At Lake Callabonna the species was growing on saline clay soils.

4. **Malacocera tricornis** (Benth.) R.H. Anderson, Proc.Linn.Soc.N.S.W.51: 382 (1926); J.M. Black, Fl.S.Aust. ed.2.: 308(1948); J.H. Willis, Hb.Pl.Vic.2: 192(1973).102

Chenolea tricornis Benth., Fl. Austr.5: 190(1870); Ewart, Fl.Vic. 458(1931). *Bassia tricornis* (Benth.) F. Muell., Syst.Census Aust.1: 30(1882); J.M. Black, Fl.S.Aust.ed.1.: 192(1924); Blackall & Grieve, West.Aust.Wildfls 1: 152(1954).

Lectotype designated here: Clay Flats, Darling River, *Dallachy s.n.* (MEL 1514717!) See Fig. 5B.

Illustration: F. Muell., Icon.Austr.Salsol.Pl.: Pl.63(1891).

Shrub erect, to 80 cm high; branches striate, densely white-lanate. *Leaves* alternate, scattered, sessile, linear to subterete, acute, (4.5-) 8-13(-17) mm long, spreading, the tips recurved, densely white or pale golden brown-villous. *Flowers* solitary, axillary, lanate; tepals 5; styles 2 or 3. *Fruiting perianth* forming a Y configuration; processes 3 rarely 4, 3.5-6.0 mm long, sub-cylindrical, compressed in horizontal or vertical plane, often curved upwards towards their tips, lanate; radicular slit adjacent to the base of the lowermost process. *Seed* ovoid to sub-orbicular, pale brown, 1.5-2 mm diameter.

Distribution

South Australia, Northern Territory, south-western Queensland, western New South Wales, north-western Victoria. (Fig. 6.)

Representative specimens (total specimens examined 64)

WESTERN AUSTRALIA: *W.V. Fitzgerald s.n.*, Skirmish Hill, 1898 (PERTH); *A.A. Mitchell s.n.*, 40 km E of Mt Vetters, 24.iv.1975 (PERTH).

SOUTH AUSTRALIA: *H.D. Andrewartha s.n.*, 31 m from Parakylia NW of Lake Torrens, 18.iii.1939 (ADW 11699); *R.J. & S.L.M. Chinnock 1471*, Redcliff Point road, W of Nectar Brook, 26.vii.1974 (AD); *M. Crisp 262*, Koonamore, 8.vii.1971 (AD); *E.H. Ising s.n.*, Evelyn Downs, 13.x.1953 (AD 96620205); *Max Koch s.n.*, Mt Lyndhurst, Sept. 1899 (NSW); *R.H. Kuchel 2647*, c. 10 km E of Moolawatana HS, 22.viii.1968 (AD); *R. Swinbourne 203*, 5 km N of Arcoona HS, 11.ix.1968 (AD); *M.C. Willcocks 21*, Glen Benda, Mt Mary, 6.ix.1971 (AD).

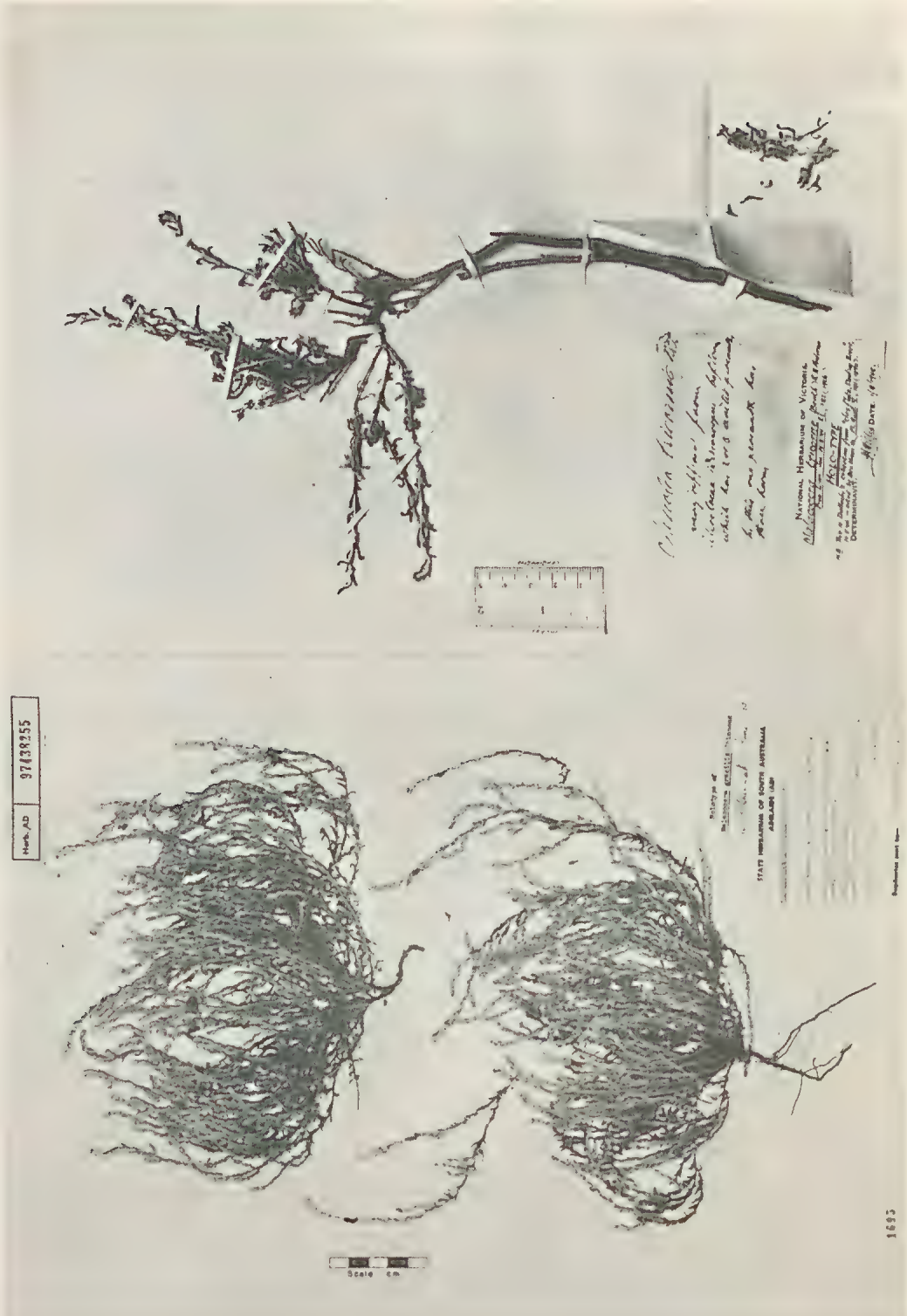

Fig. 5A. Holotype of *M. gracilis* (*R.J. Chinnock 1695*, AD).

Fig. 5B. Lectotype of *M.tricornis* (*Dallachy s.n.*, MEL).

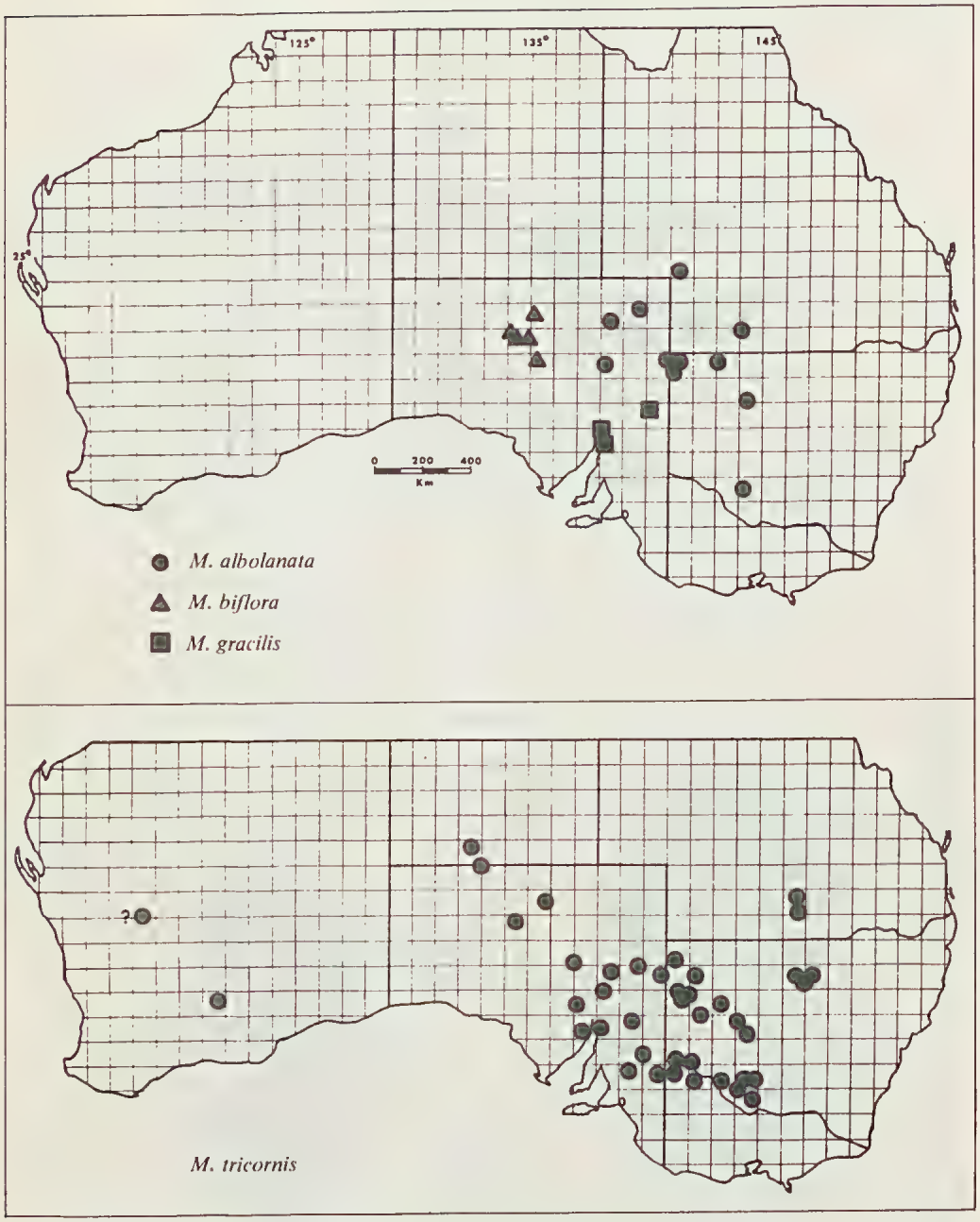

Fig. 6. Distribution of *Malacocera* species.

NORTHERN TERRITORY: *T.S. Henshall 1001*, Mt Ebeneyer, 30.iv.1975 (NT); *A. Nicholls 935*, 2 m E of Victory Downs, 18.ix.1968 (AD, NSW, NT).

QUEENSLAND: *I.M. Arthur s.n.*, "Bluegrass" via Cunnamulla, 30.xi.1970 (BRI 243311); *R.W. Purdie s.n.*, 7 km S of "Bluebank", 9.v.1977 (BRI 224289).

NEW SOUTH WALES: *E.H. Collier s.n.*, Yandama, Sept. 1910 (NSW 143876); *E.F. Constable s.n.*, Byrnedale S of Broken Hill, 16.xi.1947 (NSW); *G.M. Cunningham s.n.*, Willamurra, Gongalgon, April 1967 (NSW); *J.C. De Nardi 827*, c. 4 km ESE of Cobham HS, 28.ix.1971 (NSW); *J.C. De Nardi 1117*, 16 m E of Ivanhoe on Conoble road, 25.x.1972 (NSW); *R.B. Harvey s.n.*, Junction of the Darling and Murray Rivers, 1896 (MEL); *S. Jacobs 2199*, Fowlers Gap, 7.x.1975 (AD, NSW); *A. Morris s.n.*, Pine Creek, 25.viii.1928 (ADW 16162,BRI 243313); *J.H. Riches 42*, Tchelery, Moulamein, 28.x.1949 (CANB); *O.B. Williams 64*, Wanganella, 18.viii.1949 (CANB).

VICTORIA: *A.C. Beauglehole 40571*, Kulkyne Forest, 14.x.1972 (MEL); *J. Cullimore 37*, 3 m E of Redcliff, 15.viii.1967 (MEL); *T.S. Henshall Sy 4/6614*, Sandalong Park, 3 m E of Mildura, 24.ix.1966 (NSW); *T.S. Henshall s.n.*, NW Redcliffs, river flat behind pumping station, 12.viii.1967 (NT 41060); *J.H. Willis s.n.*, 1.5 m E of Berribee Tank, 31.viii.1948 (MEL).

Ecology

M. tricornis, the most widespread species, appears to have a far greater tolerance to different soil types and variable drainage than do the other species. It is common on alluvial flood plains, along major drainage systems, e.g. Murray River, and it is frequent around saline depressions on heavy clay soils. In addition it has been observed growing amongst *Pachycornia tenuis* (Benth.) J.M. Black on transitional soils between estuarine mudflats and the alluvial outwash plain on the upper reaches of Spencer Gulf while *Nicholls 935* records the species as growing on a "treeless stony rise amongst chenopodiaceous shrubs".

Acknowledgements

I thank Paul Wilson and Surrey Jacobs for their discussion and comments on *Malacocera*, Ludwik Dutkiewicz for the illustrations and John Jessop for his criticism of this manuscript; the Directors of the following herbaria for consultation or loan of specimens: ADW, BRI, MEL, NSW, PERTH, NT.

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